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ABSTRACT

A study was conducted to determine the instructional effectiveness of supplementary computer assisted instruction (CAI) for high school equivalency training in the military. Thirty-two students in language arts classes and 32 students in mathematics classes were randomly divided into two groups: one receiving traditional instruction and the other traditional instruction supplemented by CAI. Students were Army enlisted personnel, none of whom were high school graduates. A CAI curriculum specifically tailored to the needs of the study was developed from existing lessons in language arts and mathematics available on the University of Illinois PLATO system. Students in the traditional group received instruction concurrently in the same topics as the traditional with CAI group. On all measures, scores for students in the traditional with CAI group were higher than for students in the traditional only group. The research indicated that CAI can successfully be implemented at an Army education center for use with students in the lower abilities range. (CMV)

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CAI AS AN ADJUNCT TO TEACH BASIC SKILLS

by

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INTRODUCTION

In general, educational skills within the U.S. Army are representative of the US population as a whole. Some of its members enter service with extremely fine educational backgrounds, while others have minimal, and sometimes substandard schooling. To offset this, the US Army provides a broad range of opportunities for civilian education and training to soldiers through the Army Continuing Education System (ACES). Instructional services range from remedial reading and English as a second language to graduate school training. Courses are generally provided through contract with local civilian educational institutions and are available at most Army installations throughout the United States and overseas. Programs such as ACES exist in the military, because it is recognized that a better educated person makes a better soldier.

As weapons systems increase in complexity, the skill levels required for successful performance of military duties also increase. Yet the problems associated with lowered achievement levels in the civilian sectors also exist in the Army. Thus, a large part of the ACES Program is directed toward improving skills which have a substantial influence on the ability to develop and maintain military skills.

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[1]The opinions expressed in this paper are those of the author and do not necessarily reflect an official Department of the Army position.

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There are many problems associated with providing basic skills training to a large number of individuals at many different locations, however. Instruction must be high quality, efficient, standardized, and individualized. In addition, many of the soldiers who require basic skills training are very similar to those in civilian basic skills centers: they are generally high school dropouts with poor reading levels. In the past they have been frustrated by their educational experiences. Often their only reason for attending basic skills classes is that their commander told them to do so.

The Army Research Institute (ARI) has been exploring the use of CAI for many aspects of military training, from using tactical computers as the delivery vehicle for CAI training on how to use that tactical computer to microprocessor-based wargaming methods. A recent extension of this work has been research on using CAI for remedial basic skills training within the ACES Program precisely because CAI promises opportunities for standardized, efficient, and individualized instruction.

An initial study was conducted to determine the instructional effectiveness of CAI for high school equivalency, or General Educational Development (GED) training. The use of CAI was explored in teaching language arts and mathematics. In addition, the study sought to identify implementation problems which occur when a new technology is introduced in a military classroom.[2]

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[2]The conduct of this study was supported in part, by the Defense Activity for Non-Traditional Educational Support, Pensacola, Florida.

METHOD

Setting

This study was conducted at the Education Center at Fort Belvoir, Virginia, where GED training was provided through contract with the Fairfax County School System.[3] Three instructors taught language arts, mathematics, and preparation for the reading portions of the GED test. Classes were held three hours daily with a half hour break, five days a week, from 8:00 a.m. until 11:30 a.m.

Generally, students in the language arts class spent three weeks in class. The first day was used primarily for pretesting and the last day was used for GED testing on the "Correctness and Effectiveness of Expression" Ged test. Thus, these students had about 39 hours available for instruction. The language arts class was primarily platform lecture. Topics included spelling, punctuation, grammar, capitalization, and word usage.

The mathematics class was more individualized, with students moving through modules at their own pace from basic arithmetic to elementary algebra. Students would spend from five days to eight weeks in the mathematics class. The first day was reserved for pretesting and the "General Mathematical Ability" GED test was taken on the final day of class.

Soldiers at Fort Belvoir took the School and College Aptitude Test (SCAT) before they were enrolled in GED courses. Depending upon their scores, students were counseled to immediately take the GED test, enrolled

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[3]The cooperation and assistance of Mrs. Mary Corey, Mrs. Lucy Gard, and Mrs. Fay Sassu of the Fairfax County Skills Center in the conduct of this study is appreciated.

in GED preparation courses, or enrolled in an elementary reading course. Soldiers in GED preparation might take one, two, or all three of the GED courses.

The evaluation of the use of CAI for GED training was divided into two phases. The first phase was a preliminary period. During this time the current traditional curriculum was analyzed, eight PLATO terminals were introduced into the classroom, instructors were trained in the use of PLATO, and lessons were selected and tried out with sample students. The second phase was the evaluation period.

CAI Curriculum

A CAI curriculum specifically tailored to the needs of the Fort Belvoir Education Center was developed from existing lessons in language arts and mathematics available on the University of Illinois PLATO System. No new lessons were created. In all cases, the selected lessons fit within the framework of the existing traditional instruction. In some cases this led to excluding some potentially useful CAI lessons, but matching curricula as closely as possible was considered an important factor for the evaluation. Instructional strategies among lessons varied considerably, and included drill and practice, tutorials, tests, and game-based lessons. Instructors reviewed lessons with students and made final decisions about their inclusion in the CAI curriculum. The CAI curriculum did not cover all topics covered in the traditional curriculum. For this reason, and because PLATO was not available to students for the first 45 minutes of the class (at the time, PLATO did not begin service until 8:45 EST), the CAI curriculum was supplemented with traditional instruction.

Design

Thirty-two students in language arts classes and 32 students in mathematics classes were randomly divided into two groups: a traditional instruction group, and a traditional with CAI instruction group. The evaluation of the use of CAI was conducted first in language arts class and then in the mathematics class. Students in the traditional instruction group spent three hours daily receiving standard classroom instruction. Students receiving the traditional with CAI instruction spent about one hour a day using CAI and the remaining time was spent in traditional instruction. In all cases, students in the traditional group received instruction in the same topics as the traditional with CAI group at the same time. Only the delivery system differed.

Subjects

Subjects were enlisted personnel stationed at Fort Belvoir, VA. None of the soldiers were high school graduates. On the average they were 20 years old, had completed tenth grade, and had about a seventh grade achievement level prior to class entry as measured by the California Achievement Test (CAT).

RESULTS

On all measures, scores for students in the traditional with CAI group were numerically higher than for students in the traditional only group. These differences only approached statistical significance, however. Mean cores on the relevant portions of the High School Equivalency Examination are shown in Table 1. Analysis of variance indicated that mathematics scores were higher than language arts, F (1,60) = 41.04, p <.01. Although

means were higher for the language arts and the mathematics classes with traditional with CAI instruction, this difference only approached significance, F (1,60) = 2.96, p < .10. There was no group x curriculum interaction, F (1,60) = < 1.

TABLE 1. MEAN SCORES ON RELEVANT PORTIONS OF THE HIGH SCHOOL EQUIVALENCY EXAMINATION. NUMBERS IN PARENTHESIS INDICATE THE NUMBER OF SCORES CONTRIBUTING TO THE MEAN.

CURRICULUM / GROUP	LANG. ARTS	MATH
TRADITIONAL	37.56 (16)	46.19 (16)
TRADITIONAL PLUS CAI	40.31 (16)	47.75 (16)

Table 2 shows the mean achievement gains as measured by the California Achievement Test for each of the four groups. Analysis of variance indicated that students receiving mathematics instruction had higher gain scores than students receiving language arts instruction, F (1,51) = 13.89, p < .01. The differences between the traditional with CAI and the traditional only groups were not significant, F (1,51) = 2.10, p < .16. There was no group x curriculum interaction, F (1,51) < 1.

TABLE 2. MEAN ACHIEVEMENT GAINS (CALIFORNIA ACHIEVEMENT TEST). NUMBERS IN PARENTHESIS INDICATE THE NUMBER OF SCORES.

CURRICULUM / GROUP	LANG. ARTS	MATH
TRADITIONAL	.57 (14)	1.81 (15)
TRADITIONAL PLUS CAI	1.10 (13)	2.19 (13)

Several valuable implementation lessons were learned during the preliminary and evaluation phases. For example, the PLATO terminals were installed in the classroom about three months before the evaluation actually began. For the first month, the dedicated phone lines appeared to be dedicated more to breaking down than to transmitting data. This increased distrust in new technology among the instructors and frustration among students who would try to use the "Machines." Once students discovered that the terminals actually worked and could be used by them, they demanded to use the terminals more often during classroom time.

The instructors were worked with on a daily basis to train them on use of the system and to develop the curriculum. Eventually, instructors became more confident in the use of the system and found that their students could handle, and indeed liked PLATO and might even learn something useful.

Instead of being a thing to distrust, PLATO in the classroom was seen as a great possibility to teach their students, not only basic skills, but all sorts of classes which are typically taught in an Army Education Center. These great expectations lead to disappointments when CAI lessons were not available in certain topics, or when lessons were available but were of low quality.

DISCUSSION

The results of this research are viewed as successful enough to warrant continued exploration of the use of CAI for basic skills training within the Army. In many respects, the conduct of the study was biased against achieving improved performance with CAI as an adjunct to basic skills training. The Education Center at Fort Belvoir is considered to be one of the best Army Education sites. Teachers there are extremely dedicated to improving the educational skills of students and have, in the past, been highly successful in training students for the High School Equivalency Examination. This statement is supported by the significant achievement level gains made by students in the traditional instruction only groups. These gains of .57 years in language arts and 1.81 years in mathematics occured after only 39 hours of classroom instruction. The CAI curriculum was specifically geared to match this successful traditional curriculum.

The results and experience of the research at Fort Belvoir, clearly indicated that CAI can successfully be implemented at an Army Education Center for use with students at the lower abilities range. The CAI curriculum continues to be used on a daily basis for mathematics and language

arts training. Additional curricula are also being used to assist in teaching reading and to provide supplementary information on high school and college level subjects.

The thrust of remedial training within the Army has recently changed from preparatory instruction for the High School Equivalency Examination tc training in educational skills required for successful performance of military duties. This change requires a reconsideration of what should be taught as "basic skills" in an Army Education Center and how it should be taught. Furthermore, this change has resulted in a greater number of students receiving on-duty remedial education. The advantages of using CAI as the delivery system for basic skills instruction remain: it can provide individualized, standardized, efficient instruction to adult learners who require remedial training. Research questions which are currently being addressed at ARI include "what should be taught" (what are the "basic skills") and "how should it be taught" (what are possible instructional strategies). Future research is planned to further address the implementation of CAI for Army Basic Skills training.